Composites Used in the New F-16XL Aircraft

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The F-16XL, derived from the operationally proven F-16 Fighting Falcon, is a multimission aircraft that combines the most advanced aerodynamics and structural technology with the latest navigation and weapons delivery systems and armaments. The new features incorporated in this evolutionary aircraft result in shorter runway requirements, higher penetration speeds, and significant increases in combat range and performance.

The first F-16XL, which made its initial flight on 3 July 1982, is a single-seat version powered by the same Pratt and Whitney 100-kN (23 000-lb) thrust class F100 afterburning turbofan that propels the F-16 to Mach-2 speeds. The second prototype, which first flew on 29 Oct. 1982, is a two-seat model that is powered by a General Electric F101 derivative fighter engine (DFE). Both aircraft are undergoing extensive tests and evaluations at Edwards Air Force Base, CA.

The most distinctive feature of the F-16XL is a new, highly swept arrow-shaped wing developed by General Dynamics in collaboration with the National Aeronautics and Space Administration (NASA). The new wing, with more than twice the area of the wing on the standard F-16, along with a 142-cm (56-in.) longer fuselage, enables the F-16XL to carry over 80% more fuel internally. The wing skins are composed of an advanced graphite composite to provide the strength and stiffness for maximum performance. Development of the new wing was initiated in the mid-1970s and more than 3600 h of wind tunnel testing by General Dynamics and NASA engineers have demonstrated that it provides a balance of excellent high and low flying qualities.

These improvements are expected to lead to significant increases in range and payload over the F-16A: substantially greater combat radius on internal fuel with twice the payload and more than double the radius with equal payload.

Capitalizing on the F-16's designed-in modularity, the F-16XL configuration was easily achieved through straightforward modification. The composite wing is attached to the F-16 fuselage at existing manufacturing mating points so that more than 80% of the basic F-16 parts are retained.